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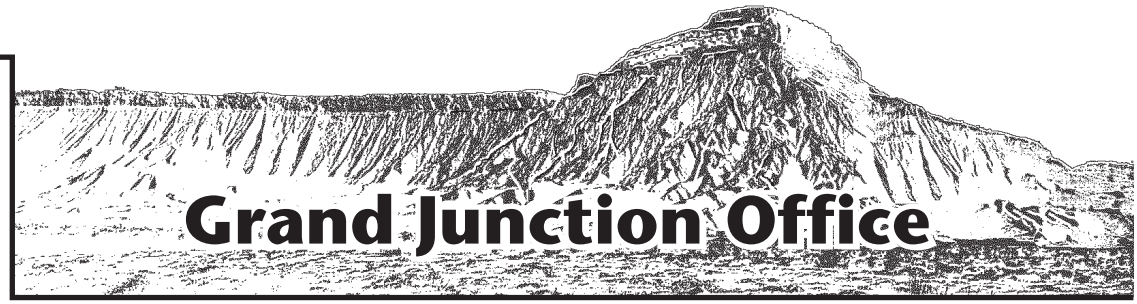
GJO–MOA 18.5.2–2

Moab Project

Floodplain and Wetlands Assessment for Interim Actions at the Moab Project Site

May 2003



U.S. Department of Energy

Work Performed Under DOE Contract No. DE–AC13–02GJ79491 for the U.S. Department of Energy

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Contents

Figures

End of current text

1.0 Introduction

The Moab Project Site is located 3 miles northwest of Moab, Utah, on the west bank of the Colorado River. Historical processing of uranium ore at the site has resulted in a 130-acre mill tailings pile and contamination of surface water and ground water. Custody of the site was transferred to the U.S. Department of Energy (DOE) in 2001 for remediation and long-term stewardship. The entire site covers approximately 400 acres, a portion of which is in the 100-year and 500-year floodplain of the Colorado River and is bisected by Moab Wash, an ephemeral stream that carries runoff during storms and snowmelt (Figure 1).

DOE is proposing to conduct interim remedial actions within the 100-year floodplain at the Moab Project Site. The purpose of the interim actions described in this assessment is to protect human health and the environment, address regulatory issues, and conduct characterization activities while DOE evaluates long-term solutions to site contamination. Stakeholders have expressed concern about the effects of mill-related contaminants entering the Colorado River. Water quality is a concern for endangered fish habitat adjacent to the site, the effects on tourism in the area, recreation in the river, and downstream water users. An Environmental Impact Statement (EIS) is being prepared to evaluate alternatives for site remediation. The Environmental Checklist and National Environmental Policy Act Interim Action Determination address additional regulatory requirements for the interim action activities.

Remediation of the Moab Project Site is mandated by the Floyd D. Spence National Defense Authorization Act, which transferred the title for the site and responsibility for cleanup to DOE. Executive Order 11988 requires that each federal agency evaluate its actions in floodplains and consider flood hazards and floodplain management. Title 10 *Code of Federal Regulations* Part 1022 includes the requirement for this assessment.

2.0 Project Description

Interim actions are scheduled to commence in 2003 and include 2 actions affecting the 100-year floodplain of the Colorado River. Figure 1 depicts the site with its associated wetlands and 100-year and floodplain and locations of the proposed activities.

The first is a plan to attempt to improve water quality in the Colorado River adjacent to the site. Elevated ammonia levels in the ground water at the site are affecting river water quality in an area of critical habitat for endangered fish species. Contaminated ground water would be extracted before it discharges into the river; the extracted ground water would be pumped to an evaporation pond.

The extraction system includes ten ground water extraction wells and nine monitor wells within 100 feet of the Colorado River. Proposed well locations are along an existing unimproved road. Ground water would be pumped at the rate of approximately 30 gallons per minute and conveyed via pipeline to a lined evaporation pond. The evaporation pond would be located outside of the floodplain, on top of the tailings pile and would cover up to 8 acres. Installation of the extraction wells and pipeline could disturb up to 2 acres of vegetation dominated by tamarisk in the 100-year floodplain of the Colorado River along the eastern edge of the site.

The ground water extraction system would operate continuously until a final decision is made through the EIS process for remedial action at the Moab Project Site. This interim action is not intended as a long-term activity. Ground water sampling will be conducted throughout the process to assess effectiveness of the system.

The second action proposed in the 100-year floodplain is a study of phytoremediation methods. Phytoremediation is the use of plants to clean up contamination. Existing vegetation on the site (mostly tamarisk) currently plays a passive role in ground water cleanup by utilizing contaminated ground water, but areas that appear stressed have the potential for enhanced ground water uptake. This possibility would be studied by installing test plots with various cultural practices such as cutting old growth and manipulating plant densities to enhance plant growth and productivity. The plan includes intrusive sampling of tamarisk plants on site. Up to half an acre of tamarisk would be disturbed for the research plots, and sampling would involve harvesting less than 5 kilograms (11 pounds) of leaf material from 20 to 100 locations in the floodplain.

Construction activities associated with the proposed interim actions on the Colorado River floodplain include

- Installing extraction and monitoring wells and a pipeline that could disturb up to 2 acres on the floodplain for ground water remediation.
- Cutting or thinning up to half an acre of tamarisk (*Tamarix ramosissima*) for construction of test plots and sampling for phytoremediation research.

Because of their temporary nature and low potential for any adverse impact, these activities are not considered critical actions for the purposes of this assessment.

3.0 Floodplain and Wetlands Description

The floodplain area extends the length of the eastern site boundary from the river's edge to distances ranging from 500 to 1,200 feet west, and is elevated up to 10 feet above the average river level. Floodplain alluvium consists of shallow sandy sediments and deeper gravelly sediments. Thickness of the shallow alluvium ranges from 8 feet to 30 feet, and the ground water within this layer is connected hydraulically to the river. Coarse sand and gravel with occasional silt and clay pockets make up the deeper alluvium layer. The water table is within 5 feet of the surface in the floodplain through most of the year (SMI 2001).

Baseflow for the river ranges from 3,000 to 4,000 cubic feet per second (cfs); the average peak based on flows from 1914 to 1999 is 22,000 cfs between April and July. The river stage increases by approximately 7 feet during average peak flow. During a 100-year flood, flow in this section of the Colorado River would reach 99,500 cfs (NRC 1997). The 500-year flood discharge for the river was estimated by the U.S. Geological Survey to be 123,500 cfs (Jacoby and Gonzales 1993). These discharges are based on flows at the Cisco gaging station, which is 35 miles upstream from Moab. The flows at the Cisco station are considered representative of the flows at the Moab Project Site because there are no significant tributaries between the gage and the site. On several occasions, floodwaters have risen 3 to 4 feet above the toe of the tailings pile.

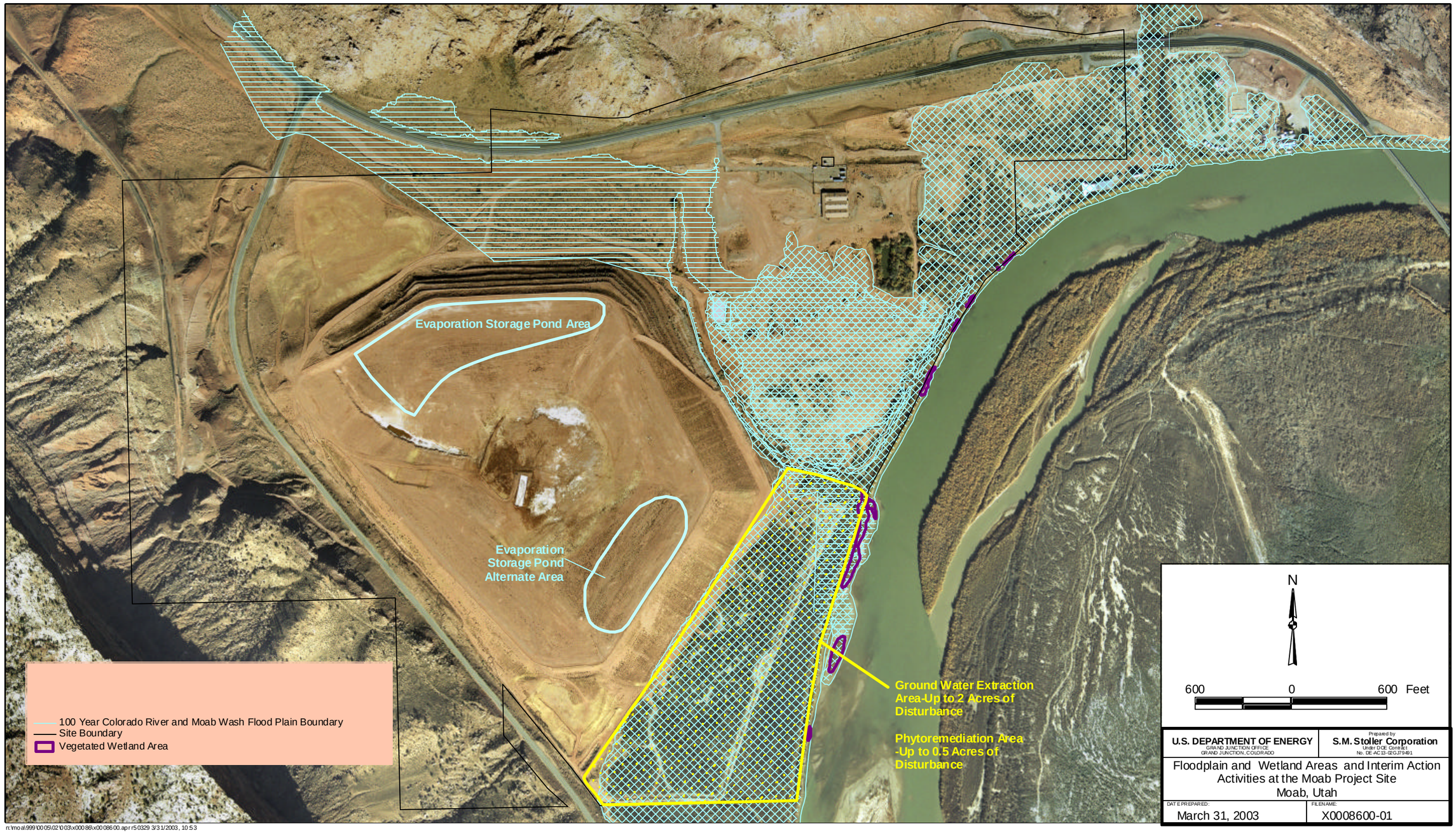

Figure 1. Moab Project Site, Floodplain and Vegetated Wetland Areas

One of the highest recorded discharges of the river was in 1984 when the flow reached 70,300 cfs, which flooded part of Moab and rose about 4 feet above the toe of the tailings pile (NRC 1999).

The U.S. Nuclear Regulatory Commission (NRC) calculated a 300,000 cfs discharge applicable to the Moab Project Site during the Probable Maximum Flood (PMF). This estimate was developed by adjusting the Standard Project Flood estimate calculated by the U.S. Army Corps of Engineers and is based on flows at the Cisco gaging station (Jacoby and Gonzales 1993). This flow would correspond to a water depth of 29 feet above the toe of the tailings pile (Mussetter and Harvey 1994).

Moab Wash runs through the middle of the site to the Colorado River. The wash drains approximately 5 square miles and is located north and east of the tailings pile (NRC 1997). Its original configuration was altered during milling operations to mitigate flooding potential during peak flows. It is an ephemeral stream with infrequent, brief runoff periods during rainstorms and snowmelt. The 100-year flow for Moab Wash is 9,480 cfs, based on precipitation of 2.6 inches in 24 hours (USACE 1995). The PMF flow for Moab Wash was estimated at approximately 16,000 cfs (NRC 1997). Practices implemented as a result of the *Moab Project Site Storm Water Pollution Prevention Plan* (DOE 2002) limit the amount of runoff entering the wash from the millsite.

Vegetation on the floodplain is dominated by tamarisk, which is dense in the areas adjacent to the river and sparse or patchy in other areas of the floodplain. Much of the floodplain area at the site has been disturbed by milling operations that began in 1956 and by remedial activities in recent years; most of the area is devoid of vegetation. Herbaceous vegetation is sparse over most of the floodplain.

Several areas of vegetated wetland are along the eastern site boundary between the upper terrace and the Colorado River (Figure 1). These areas were investigated in February 2002 and were found to contain wetland plants and soils. These areas include the sandbar areas downstream of Moab Wash that are critical habitat for the sensitive fish species. Seedling tamarisk is the predominant plant in these wetland areas; other wetland plants include saltgrass *(Distichlis spicata)*, cattail *(Typha sp*), rush (*Juncus sp.*), bulrush *(Scirpus sp)*, spikerush (*Eleocharis sp.*), redroot flat sedge (*Cyperus erythrorhizos*), and sandbar willow (*Salix exigua*). The presence of wetland vegetation and soils classifies these areas as U.S. Army Corps of Engineers jurisdictional wetland.

4.0 Floodplain and Wetlands Effects

The proposed interim actions are expected to have beneficial effects on ground water and surface water quality and minimal effects on the floodplain surface. Removal of the contaminated ground water is expected to improve water quality in the Colorado River adjacent to and downstream of the site and to alleviate poor conditions in the critical fish habitat along that reach. Monitoring and evaluation of the effects of the action on water quality will commence with the start of interim actions.

The evaporation pond, extraction wells, pipeline, and access roads should not have any significant effects beyond the construction phase and will not impact any federally-regulated waters of the United States. A stream alteration permit application has been filed with the Utah Division of Water Rights to meet state compliance regulations. Disturbances during construction are expected to be minimal and short term. Much of the floodplain at the site has been disturbed since the mill began operation, so wildlife use of the floodplain area is limited.

The activities described in this assessment may involve removal or trimming of tamarisk, which is the dominant vegetation on the site. Tamarisk is a resilient plant that is resistant to stress and recovers quickly from setbacks such as cutting or burning. The phytoremediation study will evaluate options for enhancement of ground water uptake by vegetation by implementing various options to enhance its growth and productivity. Any cutting of tamarisk that takes place should result in quick regrowth and have no long-term effect on vegetation density.

The tamarisk area is also considered potentially suitable habitat for the southwestern willow flycatcher. Although the U.S. Fish and Wildlife Service (USF&WS) concurred (letter dated April 30, 2002) with DOE's first interim action determination, DOE is preparing a new determination due to changes in the scope of the interim actions. The USF&WS will have to review the changes to determine that the revised actions will have no adverse effect on endangered species.

At this time, the effect of pumping ground water from the extraction wells is not anticipated to have noticeable effects on river levels or riverine wetlands. The interim actions are intended to be temporary. During this time, the floodplain should function as it does currently.

Design features intended to minimize any adverse impacts of the interim actions include:

- Locating the evaporation pond outside of the 100-year floodplain.
- Locating the extraction and monitor wells near existing access roads to minimize new surface disturbance.
- Minimizing the area and sampling needed for the phytoremediation research plots.

Wastes generated from these activities would be evaluated and managed according to the site Waste Management Plan to ensure protection of public health, safety, and the environment. Minor and short-term increases in noise and fugitive dust would result from the use of earth-moving and drilling equipment. Dust control applications would include the use of fresh water and calcium chloride in disturbed areas to minimize fugitive dust.

Activities described in the *Moab Project Site Storm Water Pollution Prevention Plan* (DOE 2002) will help mitigate any effects of the proposed actions caused by removal of vegetation. The activities include minimizing the flow of storm water into Moab Wash and the Colorado River by capturing site storm water runoff in sediment retention ponds and using berms and other controls to keep storm water out of site drainages.

5.0 Alternatives

Alternatives considered included up to thirteen different pond scenarios, with various options for location, size, and evaporation. The four most cost efficient systems were selected for detailed evaluation. Pond alternatives are located on the fringe of the floodplain and on top of the pile and have passive evaporation, enhanced spray, and apron evaporation as options.

The other alternative to the proposed interim actions is no action. Under this scenario, contaminated ground water would continue to flow into the river and affect surface water quality as it does presently. The disturbances caused by the implementation of the proposed actions would be avoided.

6.0 References

Jacoby, D.L., and R.O. Gonzales, 1993. *Proposed Amendment to Source Material License SUA-917 for Reclamation and Closure of Atlas Corporation's Moab Mill Disposal Area near Moab, Utah,* Memorandum for Docket File No. 40-3453, U.S. Nuclear Regulatory Commission, Region IV, Uranium Recovery Field Office, Denver, July 7.

Mussetter, R.A., and M.D. Harvey, 1994. *Geomorphic, Hydraulic, and Lateral Migration Characteristics of the Colorado River, Moab, Utah,* Final Report, MEI Reference No. 94-02, prepared for Canonie Environmental and Atlas Corporation by Mussetter Engineering Inc., Fort Collins, Colorado, May.

Shepard Miller, Inc. (SMI), 2001. *Site Hydrogeologic and Geochemical Characterization and Alternatives Assessment for the Moab Mill Tailings Site, Moab, Utah,* April.

U.S. Army Corps of Engineers (USACE), 1995. *HEC-River Analysis System Hydraulic Reference Manual, Version 2.2.1*, Hydrologic Engineering Center, Davis, California.

U.S. Department of Energy, 2001. *Plan for Remediation,* prepared for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, October.

————————, 2002. *Moab Project Site Storm Water Pollution Prevention Plan,* prepared for the U.S. Department of Energy Grand Junction Office, Grand Junction, Colorado, March.

U.S. Nuclear Regulatory Commission, 1997. *Final Technical Evaluation Report, Moab Mill Reclamation*, Office of Nuclear Materials Safety and Safeguards, Washington D.C., March.

————————, 1999. *Final Environmental Impact Statement Related to Reclamation of the Uranium Mill Tailings at the Atlas Site, Moab, Utah,* Office of Nuclear Materials Safety and Safeguards, Washington D.C., March.

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